

CLAIMS

1. Optical apparatus and a light delivery system for supplying said light to an
5 input port of the apparatus such that the light illuminates a predetermined plane
 within the apparatus,
 said light delivery system comprising a lightguide for conveying said light from a
 light source unit to said input port, the lightguide having an inlet end for connection
 to an output port of the light source unit and an outlet end for coupling to the input
10 port of the apparatus so as to provide substantially uniform light at said
 predetermined plane,
 there being means at or adjacent the outlet end of the lightguide for displacing
 images of non-uniformities present at or adjacent the outlet end of the lightguide
 away from said predetermined plane.
- 15 2. Optical apparatus according to claim 1, wherein the means for displacing
 images of non-uniformities away from said predetermined plane comprises a lens
 between the apparatus input port and said outlet end of the lightguide.
- 20 3. Optical apparatus according to claim 1, wherein the means for displacing
 images of non-uniformities away from the predetermined plane comprises a lens
 formed as an integral part of the outlet end of the lightguide.
- 25 4. Optical apparatus according to claim 2, wherein the lens is a negative lens.
5. Optical apparatus according to claim 2, wherein the lens is a positive lens.
6. Optical apparatus according to claim 3, wherein the lens is a negative lens.

7. Optical apparatus according to claim 3, wherein the lens is a positive lens.
8. Optical apparatus according to claim 1, wherein the lightguide is a liquid lightguide comprising a sheath containing a light transmissive liquid, the sheath being sealed at said inlet end and said outlet end by first and second light transmissive sealing members, respectively, there being a liquid/sealing member interface between the liquid and at least the second light transmissive member.
9. Optical apparatus according to claim 8, wherein the means for displacing images of non-uniformities away from the predetermined plane comprises a portion of the sealing member that is configured so that the interface is positioned in relatively close proximity to the outer end face of the guide.
10. Optical apparatus according to claim 9, wherein the sealing member is hollow, being closed at its outer end to form an end wall having an inner surface, the interface being at the inner surface of the end wall.
11. Optical apparatus according to claim 10, wherein the sheath fits around the sealing member.
12. Optical apparatus according to claim 8, further comprising a pressure gasket surrounding the external wall of the sheath adjacent the sealing member to clamp the sheath to the sealing member.
13. Optical apparatus according to claim 12, wherein the pressure gasket is an O-ring.
14. Optical apparatus according to claim 10, wherein the sealing member fits around the external surface of the sheath.

15. Optical apparatus according to claim 8, wherein the sealing member is a glass rod.
- 5 16. Optical apparatus according to claim 1, wherein the lightguide comprises a fiberbundle.
- 10 17. Optical apparatus according to claim 16, wherein the fiberbundle has a fused end portion and a transparent rod having one end connected to one end of the fused end portion, the distal end of the rod being the outlet end of the lightguide.
- 15 18. Optical apparatus according to claim 17, wherein the means for displacing images of non-uniformities away from the predetermined plane comprises a lens between the apparatus input port and said outlet end of the lightguide.
- 20 19. Optical apparatus according to claim 18, wherein the means for displacing images of non-uniformities away from the predetermined plane comprises a lens formed as an integral part of the outlet end of the rod.
21. Optical apparatus according to claim 18, wherein the lens is a negative lens.
- 25 21. Optical apparatus according to claim 18, wherein the lens is a positive lens.
22. Optical apparatus according to claim 1, wherein the apparatus comprises a fluorescent microscope and wherein the light that illuminates a predetermined plane within the apparatus is set at infinity by placing the lightguide at the focal point of a set of collector lenses.

23. Optical apparatus according to claim 1, further comprising an adapter means for coupling said outlet end of the lightguide to said input port at a predetermined position.

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24. Optical apparatus according to claim 23, wherein the adapter means comprises collector lens means, means for positioning the outlet end of the lightguide at a focal plane of the collector lens means at an input side thereof and means for coupling the opposite side of the collector lens means optically to the input port.

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25. Optical apparatus according to claim 24, wherein the means for displacing comprises a lens between the lightguide and the collector optics.

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26. A light delivery system for supplying light to an input port of an optical apparatus such that the light illuminates a predetermined plane within the apparatus, said light delivery system comprising a light source unit for supplying said light, a lightguide for conveying said light from the light source unit to said input port; the lightguide having an inlet end connected to an output port of the light source unit and an outlet end coupled to the input port of the apparatus so as to provide substantially uniform light at said predetermined plane, there being means at or adjacent the outlet end of the lightguide for displacing images of non-uniformities present at the outlet end of the lightguide away from said predetermined plane.

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27. A light delivery system according to claim 26, wherein the means for displacing comprises a lens.

28. A lightguide for connecting a light source unit to an optical apparatus

according to claim 1, so as to supply light to an input port of the apparatus that illuminates a predetermined plane within the apparatus,
the lightguide having an inlet end for connection to the output port of a light source unit and an outlet end for connection to the input port of the apparatus
5 there being means at or adjacent the outlet end of the lightguide for displacing images of non-uniformities present at or near the outlet end of the lightguide away from said predetermined plane.

10 29. A lightguide according to claim 28, wherein the means for displacing comprises a lens.

15 30. An adapter unit for interfacing light from a lightguide of a light delivery system to an input port of the optical apparatus of claim 1 such that the light illuminates a predetermined plane within the apparatus,
the adaptor having an output port for connection to said optical apparatus and an input port for connection to the outlet end of the lightguide and comprising optical elements for providing substantially uniform light at said predetermined plane, there
20 being means at or adjacent the input port of the adaptor for displacing images of non-uniformities present at the outlet end of the lightguide away from said predetermined plane.

31. An adapter unit according to claim 30, wherein the means for displacing comprises a lens.